REMARKS

The claims have been amended based on the method for measuring the coupling reaction rate constant disclosed on page 94, lines 6-22 of the specification. Also, new claims have been added based on, e.g., recitations in original claims.

Entry of the above amendments is respectfully requested.

Obviousness-Type Double Patenting Rejection

On page 2 of the Office Action, in paragraph 1, claims 13-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2-17 of U.S. Patent No. 6,346,359 (Yamada et al).

The Examiner's Position

The Examiner's position is that although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed recording material in the U.S. Patent 6,346,359 anticipates and meets recited claims 13-20 for a recording material comprising a support, and at least one recording layer containing a diazo compound and a coupler which reacts with the diazo compound for developing color, wherein the coupler has a leaving group at a coupling position. In this regard, the Examiner indicates that Yamada et al claims a coupler having a leaving group defined by "L" in the formula used in a recording material, see claim 2. The Examiner indicates that the claims of Yamada et al also meet the recited limitation of claim 14 wherein Yamada's couplers possess the same leaving groups as disclosed in the application, thus inherently meeting the coupling reaction rate as recited in claim 14.

Applicants' Response

In response, Applicants submit herewith a terminal disclaimer to obviate this rejection and expedite allowance of this application.

Accordingly, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. §112, Second Paragraph

On page 3 of the Office Action, in paragraph 3, claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner's Position

The Examiner indicates that the language found in claims 1 and 2 fails to particular point out and establish clear metes and bounds for the desired protection. In particular, the Examiner indicates that the claim scope is unclear based on the recited relative coupling reaction rate, because rather than state the rate or recite the structure of the coupler, Applicants use a comparison to a coupling rate between a diazo compound and a coupler having a hydrogen atom at the leaving position. The Examiner asserts that this language is unclear and fails to set the metes and bounds to the claims such that one skilled in the art attempting to avoid infringement would not know what the coupling rate of the reaction rate would be because of the numerous possible reaction conditions, such as the surrounding variables and variables within the reaction pot.

Applicants' Response

In response to this rejection, Applicants submit initially that the present invention is unique in that it is based on the finding that, in some cases, a coupling reaction rate of a diazo compound and a coupler having a leaving group at a coupling position thereof becomes faster than that of the diazo compound and a coupler having a hydrogen atom at a coupling position thereof. Applicants submit that this finding is contrary to the general understanding of coupling reaction rates.

While Applicants believe that the scope of the claims as originally presented would have been clear to one skilled in the art, to further clarify what is being claimed Applicants have amended the claims based on the method for measuring the coupling reaction rate constant disclosed on page 94, lines 6-22 of the specification.

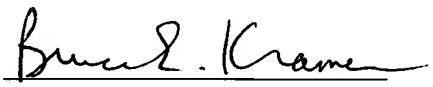
In view of the above, Applicants submit that the present claims satisfy the requirements of 35 U.S.C. §112, second paragraph. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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WASHINGTON OFFICE

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PATENT TRADEMARK OFFICE

Date: March 19, 2003

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A method for forming an azo colorant, wherein a coupler having a leaving group at a coupling position thereof and a diazo compound are used, and the method has a faster coupling reaction rate constant, measured by mixing equivalent amounts of an ethyl acetate solution containing an 8×10^{-5} mole concentration of the diazo compound and an ethyl acetate solution containing an 8×10^{-3} mole concentration of the coupler and a base with a stopped flow measurement device and by measuring change over time of an absorbance of the produced colorant and applying the resultant value to the following formula (1), than an azo dye-forming reaction between the diazo compound and [the] a coupler having a [haydrogen] hydrogen atom at [the] a coupling position thereof:

$$D\{\text{colorant}\}/dt = k\{\text{diazo compound}\} \quad \text{formula (1)}$$

wherein k denotes the coupling reaction rate constant (s^{-1}), t denotes time (s), {colorant} denotes a mole amount of the produced colorant, and {diazo compound} denotes an initial mole amount of the diazo compound (mol).

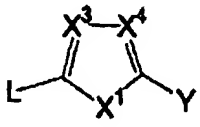
2. (Amended) A method for forming an azo colorant, wherein a coupler having a leaving group at a coupling position thereof and a diazo compound are used, and the method has a coupling reaction rate constant k, measured by mixing equivalent amounts of an ethyl acetate

solution containing an 8 x 10^{-5} mole concentration of the diazo compound and an ethyl acetate solution containing an 8 x 10^{-3} mole concentration of the coupler and a base with a stopped flow measurement device and by measuring change over time of an absorbance of the produced colorant and applying the resultant value to the following formula (1), of at least 0.1 s^{-1}:

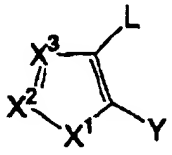
D {colorant}/dt = k {diazo compound} formula (1)

wherein k denotes the coupling reaction rate constant (s^{-1}), t denotes time (s), {colorant} denotes a mole amount of the produced colorant, and {diazo compound} denotes an initial mole amount of the diazo compound (mol).

3. (Amended) The method for forming an azo colorant according to claim 1, wherein the coupler has a structure represented by one of the following general formulae (1), (2), (3), (4), and (5) [as follows.]:



(1)



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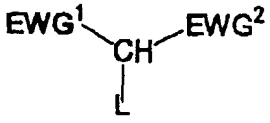

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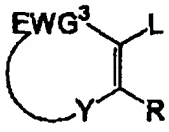

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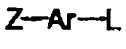
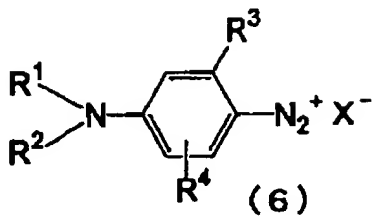


(5)

in which X^1, X^2, X^3, and X^4 each independently [represents] represent an atomic group necessary for forming a five-membered aromatic heteroring; Y represents one of a hydroxyl group, an amino group which may have a substituent, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R represents one of a hydroxyl group, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an amino group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may have a substituent; Z represents one of a hydroxyl group and an amino group which may have a substituent; Ar represents a benzene ring, naphthalene ring, pyridine ring or quinoline ring, each of which may have a substituent; L represents a substituent that is [relesable] releasable at a time of coupling with the diazo compound; EWG^1, EWG^2 and EWG^3 each independently represents an electron-attractive group; and [pairs,] X^1 and Y, EWG^1 and EWG^2, and Y and R may each link with each other to form a ring.

4. (Amended) The method for forming an azo colorant according to claim 3, wherein the diazo compound is a compound represented by one of the following general formulae (6), (7), and (8) [as follows]:



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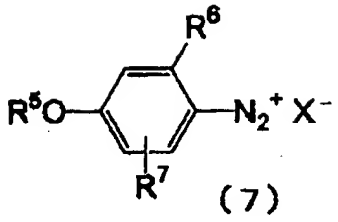

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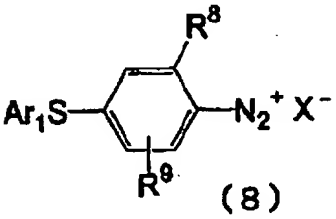
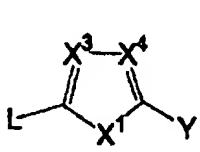


(8)

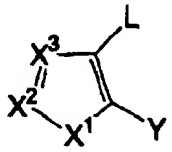
in which, in general formulae (6) and (7)[:], R^1 and R^2 each [represents] represent one of a hydrogen atom and an alkyl group which may have a substituent; R^1 and R^2 may link with each other to form a heterocycle; R^1 and R^2 cannot both be hydrogen atoms; R^3 represents one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, an arylthio group which may have a substituent, an alkylsulfonyl group which may have a substituent, and an arylsulfonyl group which may have a substituent; R^4 represents one of a hydrogen atom, an alkyl group which may have a substituent, and an alkoxy group which may have a substituent; R^5 represents one of a hydrogen atom and an alkyl group which may have a substituent; R^6 and R^7 each [represents] represent one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may have a substituent; R^6 and R^7 may be the same [and may be] or different from each other; and X^- represents an acid anion, and

in the general formula (8)[:], Ar^1 represents an aryl group which may have a substituent; R^8 and R^9 each [represents] represent one of an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R^8 and R^9 may be the same [and may be] or different from each other; and X^- represents an acid anion.

5. (Amended) The method for forming an azo colorant according to claim 2, wherein the coupler has a structure represented by one of the following general formulae (1), (2), (3), (4), and (5) [as follows.]:



(1)



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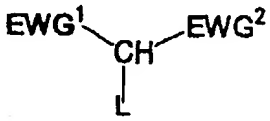

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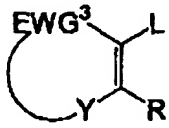


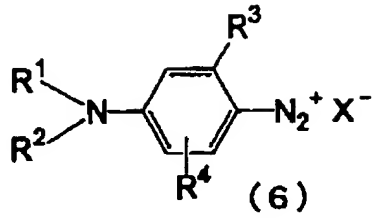
(4)

(5)

in which X^1, X^2, X^3, and X^4 each independently [represents] represent an atomic group necessary for forming a five-membered aromatic heteroring; Y represents one of a hydroxyl group, an amino group which may have a substituent, an alkyl group which may have a substituent, an aryl

group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R represents one of a hydroxyl group, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an amino group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may have a substituent; Z represents one of a hydroxyl group and an amino group which may have a substituent; Ar represents a benzene ring, a naphthalene ring, a pyridine ring or a quinoline ring, each of which may have a substituent; L represents a substituent that is [relesable] releasable at a time of coupling with the diazo compound; EWG^1, EWG^2 and EWG^3 each independently [represents] represent an electron-attractive group; and [pairs,] X^1 and Y, EWG^1 and EWG^2, and Y and R may each link with each other to form a ring.

6. (Amended) The method for forming an azo colorant according to claim 5, wherein the diazo compound is a compound represented by one of the following general formulae (6), (7), and (8) [as follows.]:



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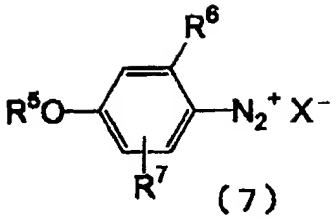

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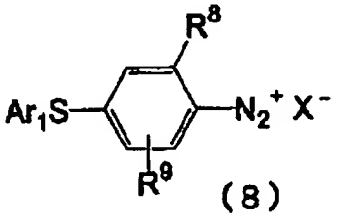


(8)

in which, in general formulae (6) and (7)[:], R^1 and R^2 each [represents] represent one of a hydrogen atom and an alkyl group which may have a substituent; R^1 and R^2 may link with each other to form a heterocycle; R^1 and R^2 cannot both be hydrogen atoms; R^3 represents one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, an arylthio group which may have a substituent, an alkylsulfonyl group which may have a substituent, and an arylsulfonyl group which may have a substituent; R^4 represents one of a hydrogen atom, an alkyl group which may have a substituent, and an alkoxy group which may have a substituent; R^5 represents one of a hydrogen atom and an alkyl group which tray have a substituent; R^6 and R^7 each [represents] represent one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may

have a substituent; R^6 and R^7 may be the same [and may be] or different from each other; and X^- represents an acid anion, and

in the general formula (8)[:], Ar^1 represents an aryl group which may have a substituent; R^8 and R^9 each [represents] represent one of an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R^8 and R^9 may be the same [and may be] or different from each other; and X^- represents an acid anion.

13. (Amended) A recording material comprising a support and [, on the support,] at least one recording layer disposed thereon containing a diazo compound and a coupler which reacts with the diazo compound for developing color, wherein the coupler has a leaving group at a coupling position thereof.

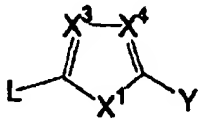
14. (Amended) A recording material comprising a support and [, on the support,] at least one recording layer disposed thereon containing a diazo compound and a coupler [,] which reacts with the diazo compound for developing color, wherein the coupler has a leaving group at a coupling position thereof, the diazo compound and the coupler have a faster coupling reaction rate constant therebetween, measured by mixing equivalent amounts of an ethyl acetate solution containing an 8×10^{-5} mole concentration of the diazo compound and an ethyl acetate solution containing an 8×10^{-3} mole concentration of the coupler and a base with a stopped flow

measurement device and by measuring change over time of an absorbance of the produced colorant and applying the resultant value to the following formula (1), than in a case of [the] a coupler having a hydrogen atom at [the] a coupling position thereof, and the coupling reaction rate constant k therebetween is at least 0.1 s^{-1}[;]:

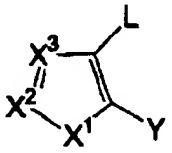
D [colorant]/dt = k [diazo compound] formula (1)

wherein k denotes the coupling reaction rate constant (s^{-1}), t denotes time (s), {colorant} denotes a mole amount of the produced colorant, and {diazo compound} denotes an initial mole amount of the diazo compound (mol).

15. (Amended) The recording material according to claim 13, wherein the coupler has a structure represented by one of the following general formulae (1), (2), (3), (4), and (5) [.]:



(1)



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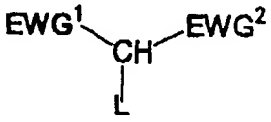

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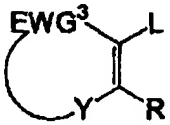

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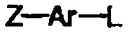
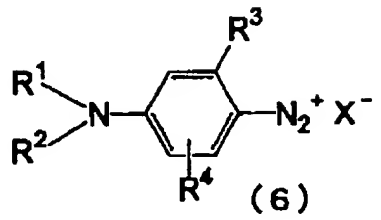


(5)

in which X^1, X^2, X^3, and X^4 each independently [represents] represent an atomic group necessary for forming a five-membered aromatic heteroring; Y represents one of a hydroxyl group, an amino group which may have a substituent, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R represents one of a hydroxyl group, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an amino group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may have a substituent; Z represents one of a hydroxyl group and an amino group which may have a substituent; Ar represents a benzene ring, a naphthalene ring, a pyridine ring or a quinoline ring, each of which may have a substituent; L represents a substituent that is [relesable] releasable at a time of coupling with the diazo compound; EWG^1, EWG^2 and EWG^3 each independently [represents] represent an electron-attractive group; and [pairs,] X^1 and Y, EWG^1 and EWG^2, and Y and R may each link with each other to form a ring.

16. (Amended) The recording material according to claim 15, wherein the diazo compound is a compound represented by one of the following general formulae (6), (7), and (8) [.]:



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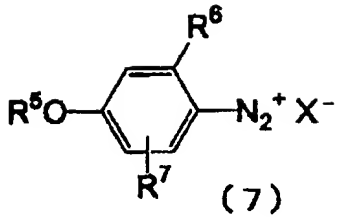

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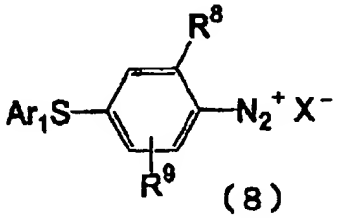


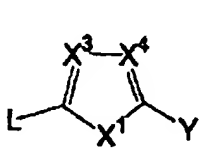
(8)

in which, in general formulae (6) and (7)[:], R^1 and R^2 each [represents] represent one of a hydrogen atom and an alkyl group which may have a substituent; R^1 and R^2 may link with each other to form a heterocycle; R^1 and R^2 cannot both be hydrogen atoms; R^3 represents one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, an arylthio group which may have a substituent, an alkylsulfonyl group which may have a substituent, and an arylsulfonyl group which may have a substituent; R^4 represents one of a hydrogen atom, an alkyl group which may have a substituent, and an alkoxy group which may have a substituent; R^5 represents one of a hydrogen atom and an alkyl group which may have a substituent; R^6 and R^7 each [represents] represent one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may

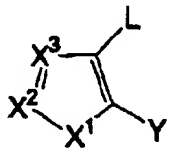
have a substituent; R^6 and R^7 may be the same [and may be] or different from each other; and X^- represents an acid anion, and

in the general formula (8)[:], Ar^1 represents an aryl group which may have a substituent; R^8 and R^9 each [represents] represent one of an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R^8 and R^9 may be the same [and may be] or different from each other; and X^- represents an acid anion.

18. (Amended) The recording material according to claim 14, wherein the coupler has a structure represented by one of the following general formulae (1), (2), (3), (4), and (5) [.]:



(1)



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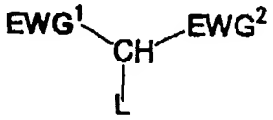
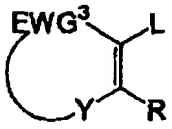
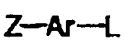


(3)



(4)

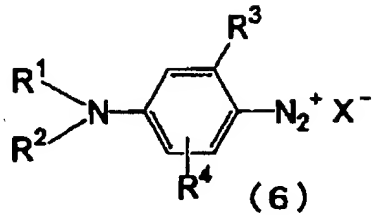


(5)

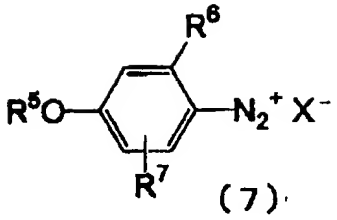
in which X^1, X^2, X^3, and X^4 each independently [represents] represent an atomic group necessary for forming a five-membered aromatic heteroring; Y represents one of a hydroxyl group, an

amino group which may have a substituent, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R represents one of a hydroxyl group, an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an amino group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may have a substituent; Z represents one of a hydroxyl group and an amino group which may have a substituent; Ar represents a benzene ring, a naphthalene ring, a pyridine ring or a quinoline ring, each of which may have a substituent; L represents a substituent that is [relesable] releasable at a time of coupling with the diazo compound; EWG^1, EWG^2 and EWG^3 each independently [represents] represent an electron-attractive group; and [pairs,] X^1 and Y, EWG^1 and EWG^2, and Y and R may each link with each other to form a ring.

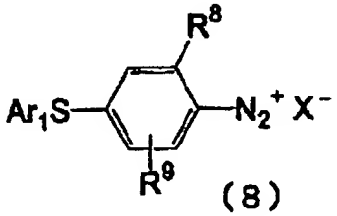
19. (Amended) The recording material according to claim 18, wherein the diazo compound is a compound represented by one of the following general formulae (6), (7), and (8) [.]:



(6)



(7)



(8)

in which, in general formulae (6) and (7)[:], R^1 and R^2 each [represents] represent one of a hydrogen atom and an alkyl group which may have a substituent; R^1 and R^2 may link with each other to form a heterocycle; R^1 and R^2 cannot both be hydrogen atoms; R^3 represents one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, an arylthio group which may have a substituent, an alkylsulfonyl group which may have a substituent, and an arylsulfonyl group which may have a substituent; R^4 represents one of a hydrogen atom, an alkyl group which may have a substituent, and an alkoxy group which may have a substituent; R^5 represents one of a hydrogen atom and an alkyl group which may have a substituent; R^6 and R^7 each [represents] represent one of an alkyl group which may have a substituent, an alkoxy group which may have a substituent, an aryloxy group which may have a substituent, an alkylthio group which may have a substituent, and an arylthio group which may

have a substituent; R^6 and R^7 may be the same [and may be] or different from each other; and X^- represents an acid anion, and

in the general formula (8)[:], Ar^1 represents an aryl group which may have a substituent; R^8 and R^9 each [represents] represent one of an alkyl group which may have a substituent, an aryl group which may have a substituent, an alkoxy group which may have a substituent, and an aryloxy group which may have a substituent; R^8 and R^9 may be the same [and may be] or different from each other; and X^- represents an acid anion.

Claims 21-32 are added as new claims.